The *Times*, which, with other of the daily papers, had previously quoted our remarks of last week on this subject, states that "large as was the concourse of persons who availed themselves of the cheap excursion to Bath and Bristol on Sunday week, it was far exceeded by the numbers who did so on Sunday last. The number conveyed by the three trains on Sunday must have amounted to between 5,000 and 6,000 persons, and the profit netted by the company in consequence very considerable. We observe that the excursion is already announced to be repeated on Sunday next." In complete accordance with the results of other trials of low fares, we find it stated in the directors' report to be presented next week to the North British shareholders, that "the short traffic in the vicinity of Edinburgh, which has been much competed for by coaches, has all along been a source of anxiety to the directors; and they recently resolved to attempt to improve it by a large reduction of fares, and by running a few extra trains, during the summer months, to and from Portobello. The result has been most satisfactory, inasmuch as, during the short time the experiment has been going on, the revenue has increased upwards of 56 per cent. over the corresponding period of last year; while the number of passengers has been multiplied nearly fourfold, without any material addition being made to the expense of working."——An experiment is making by the Midland Railway Company to carry first-class passengers at one penny per mile, and second-class at a halfpenny. So far it is said to have proved very satisfactory, and if it continue it will be tried between Derby and Nottingham. Success there will then cause a further trial.——Penny omnibuses have commenced running between the South-Eastern Railway and the Bank.

PASSAGE OF WATER THROUGH PIPES.*

My attention having been drawn to an article in the last BUILDER, with the above heading, I hasten to give a return of the working of a six-inch pipe, of the diameter referred to by "Baylis." The pipe was employed under the following circumstances. A tract of land, sixty acres in extent, had to be thoroughly drained with drains 30 feet apart, and 4 to 6 feet in depth. This land was comparatively level, but situate at the mouth of a ravine, at the base of an elevated and extensive range of hills; and though the stream or torrent from this precipitous catchment intersected the land to be drained, it was not considered advisable, or even possible, to adopt it as a main drain, because, like all mountain rivers, it deposited boulders and gravel at each flood; and as it was requisite to unwater the lower part of the lands when the river was carried under the junction of two public roads, at a level inadequate to discharge deep drainage water, Doulton's 6-inch glazed stoneware pipe was laid through the arch under the bed of the river, and continued straight down stream to avoid elbows. It was laid with much care, with an inclination of 1 in 200, the joints set with Roman cement diluted with hot water, and securely coated under and about with good well-puddled clay. The fall of rain in the locality referred to is 36·03 inches per annum, and by some has been estimated at 40·20 inches; besides which, there were four strong springs outcropping from higher lands, and in one place a slight percolation from the intersecting river to parallel minor drains. The limits of this communication will not permit me to enter into the calculations which guided me in the dimensions of this conduit. The result has been satisfactory, and I give you the facts, as, to the practical man, one fact is worth a thousand arguments. Your correspondent must, however, observe, that the water discharged was filtered through broken stone, and held little, if any, matter in suspension.

T. B.

VENTILATION OF ST. GEORGE'S HALL, LIVERPOOL.—Dr. Reid is about to make experiments with a view of testing the best mode of ventilating St. George's Hall. By an arrangement with the council, he will be employed during a space of two months.

* Results of some experiments on this subject are in type.

APPROPRIATION OF RAILWAY ARCHES.

A CORRESPONDENT, "F. S.," has forwarded to us a suggestion that accommodation might be provided for hundreds of destitute beings by fitting up the arches of railways that terminate in London and other crowded cities, seemingly unaware that the idea was started in our pages long ago, and led to the establishment of a society to effect the desired object. To what extent the society has operated we do not know. The correspondent in question says justly—"These arches are at present perfectly useless, except in reference to the railway of which they form a part, but by *enclosing the sides, constructing one floor*, and *forming a passage longitudinally*, an excellent shelter from the storm and cold might be formed; mere stalls and straw pallets and a plentiful supply of water would be all the internal fitting required, and the most complete ventilation might be effected by luffer boarding at the top of each apartment, while the cleanliness of the lodgings might be imposed on those who occupied them.

A trifling outlay might effect all this, and houses be provided for the houseless poor (without the cost or time of erection) who, for the want of properly regulated establishments, infest the low lodging-houses of our city, where vice in her most repulsive form dwells, and where the children of misery and crime exist and hide themselves, unvisited by the pure air and sunlight of heaven. Beneath the arches of our railways the poorest beggar may at least enjoy uncontaminated *atmosphere* and uninterrupted *light* in addition to an effectual shelter from the inclemency of the weather. It would be far from advisable that asylums such as these should not be under the direction and guidance of regular inspectors or overseers; on the contrary, they should be most strictly and carefully managed, in order to prevent them being abused or degenerating into the same hotbeds of villany that the low and miserable lodging-houses are now.

Would not places such as these tend greatly to the diminution of crime, inasmuch as an immense number of the poorest class, and these, it may be, of a dissolute character, would be removed from temptation of many kinds that naturally occurs to those who, from necessity, wander about without a roof to cover them?"

ON HOOPING RAILWAY ARCHES.

DURING the construction of the viaducts for railways in this country, many disastrous accidents have occurred by the falling of part of the arches, which has generally happened at the time of the centres being struck. The cause of these disasters it has not been difficult to ascertain, and is to be traced mainly to a more than usual continuance of wet weather during or immediately after the construction. The arches in question being usually constructed of brickwork, or of stones of small dimensions, occasioning a great multitude of joints, a proportionally large quantity of mortar has of necessity to be used in filling these joints. An unusual quantity of rain falling would naturally prevent the mortar from setting; and the mortar being thus kept in a kind of semi-fluid state, a small inequality of pressure in the different parts of the arch would be sufficient to bring the whole to destruction.

As a remedy for the disasters here spoken of, we are induced to propose the following plan:—As soon as an arch is completed, a series of hoops, formed of strip-iron, are to be laid over the exterior surface at equal distances, extending from pier to pier. Each hoop is to be composed of two pieces of equal length, each part extending from the crown of the arch along to the exterior surface, or extrados, and then across the piers to the springing of the adjoining arches on both sides, where they are to be turned up, in order to obtain a sufficient hold on the brickwork. It being supposed that all the arches are hooped in the same way, the hoops of the adjoining arches will in like manner proceed across the piers in the contrary direction, to the springing of the arch of which we are more particularly speaking, where they are to be turned up as before. The hoops of the adjoining arches are to be so arranged that the turned-up ends of the ranges of hoops (extending over the whole viaduct) may just pass alongside each other, and the space between the turned ends being firmly built up with brickwork, on the hoops being tightened they will mutually draw against each other. At the crown of the arches, the two parts of the hoops are coupled together by means of screw bolts: these should not be less than three in number, in order that a bolt may be exchanged without inconvenience, in case it should be required. These ends of the hoops are turned up, and strengthened with angle-pieces, in order more effectually to withstand the pressure of the screw bolts. The two ends should not approach each other within nine or ten inches in the first instance, in order to afford room for the closing up of the ends when the bolts are screwed up. A thin piece of sheet-iron is put under the two ends, between the iron and the brickwork of the arch, in order to facilitate the sliding of the hoop on the arch when undergoing the process of tightening. At the extremities of the viaduct, the ends of the last hoops will require to be secured by being carried to a sufficient depth in the brickwork.

In a viaduct 30 feet wide, five or six ranges of hoops placed across the arch, at equal distances, will be sufficient. These may be made of strip iron, 9 inches wide × $\frac{1}{4}$ of an inch thick. If five are employed, the total breaking weight of the whole will be nearly double the gross weight of one of the arches to which they are applied—that is, supposing the arches to be about 35 feet span. The object of the hooping being to counteract the inequality of pressure, or want of balance in the different parts of the arches, and as this difference of pressure can only be a very small fraction of the total weight of one of them, therefore the strength of iron given above will be more than amply sufficient for the purpose intended. The piers being raised to the height of the crowns of the arches, and the arches filled up at the haunches to the same level, the screw bolts at the different crowns are to be tightened. The arches are to be left in this state till it is judged that the mortar is sufficiently set, when the centres are to be eased as in due course. On this being done, the screw bolts at the different crowns are to be again tightened, in order to follow up as the arches settle. Every thing about the arches appearing secure, the centres may now be removed, and the hoops will prevent any alteration taking place in the shape of the arches.

When the viaduct is completed, the hooping will of course, be completely concealed in the interior of the brickwork. JOHN POTTER.*

BREAKING WEIGHT OF RED PINE.

YOU will oblige me by inserting the following constants, which may be of service to those using my tables, and who may, for the same quality of timber, adopt the standard of strength deduced from the experiments upon American red pine balks, given from Mr. Clark's work in last week's BUILDER:—

"Mean of two experiments upon American red pine, 12 × 12 and 15 feet long, clear bearing. Breaking weight, suspended from the middle, 14 tons, or 280 cwts.

"The strength $S = \frac{280}{115{\cdot}2 \times 6} \times 1344 = 816{\cdot}6$"

The strength, depth, and breadth of any species of timber of the assumed standard strength 1344 being 1·00; then for the strength 816·6, we have as follows:—

Table of Constants No. 1, p. 2, in Lea's Tables.

Relative strength	·6076 col.	I.
Depth to have the same strength . 1·283	,,	II.
Breadth to have the same strength ..... 1·646	,,	III.

Table of Constants No. 2, p. 50—Second Series.

Weight uniformly loaded.

Factor to give the breaking weight..... 4·861	col.*	I.
Reciprocal of the same ..... ·2057	,,	II.

Weight suspended from the middle.

† Factor to give the breaking weight..... 2·430	,,	III.
Reciprocal of the same..... ·4115	,,	IV.

Table of Constants No. 3, p. 96—Third Series.

Factor to give the depth and breadth to have the same strength ..... 1·181	col.	I.

WILLIAM LEA.

AT MADRID a new grand Italian Opera House, built at the expense of the state, to be called "Teatro del Orienta," is about to be opened.—*Literary Gazette.*

* From the *Engineer and Mechanic*.

† The tabular weight for the coaching, in the second series of the above-named tables, multiplied by 2·43, gives the breaking weight suspended from the middle, for the strength 816·6.

At page 70 of the tables, the tabular weight for 12 × 12 and 15 feet long is 115·2 cwts.

115·2 × 2·43 = 279·94 cwts., the breaking weight suspended from the middle.

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